



US Army Corps
of Engineers®

SAN FRANCISCO DISTRICT

Regulatory Branch
1455 Market Street
San Francisco, CA 94103-1398

PUBLIC NOTICE

Project: Bahia Tidal Wetland Restoration

NUMBER: 29321N

DATE: July 31, 2007

RESPONSE REQUIRED BY: August 31, 2007

PROJECT MANAGER: Katerina Galacatos

PHONE: 415-503-6778

Email: Katerina.Galacatos@usace.army.mil

1. **INTRODUCTION:** Ms. Barbara Salzman, of the Marin Audubon Society, P.O. Box 599, Mill Valley, California 94942, (415-924-6057) has applied for a U.S. Army, Corps of Engineers (Corps) permit to place approximately 138,971 cubic yards of fill material into 34.1 acres of seasonal wetlands in order to restore 377 acres of tidal wetlands and 11.7 acres of enhanced and created seasonal wetlands at the Bahia project site. The proposed project would restore diked seasonal wetlands to tidal wetlands, while retaining some existing seasonal wetlands with a new terrestrial transition zone connected to upland (hillslope) oak woodland habitat. The 632-acre project site is located south of Black John Slough, in the southeast corner of the City of Novato, Marin County, California (Figure 1). This permit application is being processed pursuant to the provisions of Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. Section 403) and Section 404 of the Clean Water Act (33 U.S.C. § 1344). Section 10 of the Rivers and Harbors Act regulates all work or structures in navigable waters of the United States. Section 404 of the Clean Water Act regulates the discharge of dredged and fill material below the plane of ordinary high water in non-tidal waters of the United States and within the lateral extent of wetlands adjacent to these waters.

2. PROPOSED PROJECT:

Project Site: The project site on the western side of the channel contains three units or areas: West Bahia which is 216 acres that are below sea level;

Central Bahia which is 117 acres that lies mostly at low intertidal elevations; and Mahoney Spur which is 39 acres that lie mostly at mid to upper intertidal elevations. The project site on the eastern side of the channel is known as East Bahia and consists of 55 acres of high artificial levees and fill platforms above sea level constructed of drained bay mud and soil from adjacent hills, surrounding an artificial open-water lagoon owned by the Bahia Homeowners Association.

The project site has several owners and past uses. Most of West Bahia including a one-acre pond is owned by California Department of Fish and Game (CADFG). The Blue Oak Woodland Area is owned by the Marin County Open Space District and leased by CADFG. A five acre RV parking lot has been used for recreation vehicle parking for the Bahia Homeowners Association and will serve as the project's construction access via Bahia Drive. East Bahia is owned by Marin Audubon Society and includes three peninsulas constructed as future building sites from materials dredged from the adjacent channels. East Bahia also contains a Pacific Gas and Electric transmission line with a 150-foot easement and a Novato Sanitary District pump station.

The majority of the project site was originally diked for agricultural use. However, the project site has not been in agricultural cultivation for the past thirty years and has subsided several feet. In addition, the pump in the northeast corner of West Bahia has not been in operation since June 2003.

Project Description: The proposed project will be constructed in two phases (Figure 2). Most of the construction will occur during Phase 1. Only the lowering and breaching of the perimeter levees and construction of ditch blocks in West Bahia will occur during Phase 2.

Portions of the perimeter levees at West Bahia, Mahoney Spur, Central Bahia, and East Bahia would be lowered and breached with some segments left at their current elevation to provide high tide refugia (Figure 3). About 9,000 feet of levees at West Bahia, Mahoney Spur, and Central Bahia and about 5,000 feet of levees at East Bahia would be lowered.

The perimeter levees at West Bahia, Mahoney Spur, Central Bahia, and East Bahia would be breached and channels excavated through each area to restore tidal action and sediment deposition to these areas for the development of vegetated salt marsh and smaller order channels (Figures 4 and 5). The channels would be of varying lengths and widths based on existing topography and restoration designs. About five acres would be disturbed by the lowering of the levees and excavation of the levee breaches and channels. Of this total, about 0.21 acre of existing upland refugia and transitional habitat and about 0.01 acre of tidal salt marsh would be lost where levee breaches and pilot channels are located through existing tidal marsh.

Construction of the proposed project within and adjacent to tidal marsh habitat is anticipated to begin in September 2007 and to be completed by February 2008. Construction in the interior diked non-tidal basin, including dewatering, is proposed to begin in August 2007. All proposed construction dates are contingent on dates of issuance of multiple Federal and State permits.

Implementation of the proposed project is anticipated to result in the foreseeable restoration of about 83 acres of new tidal brackish/salt marsh at Central Bahia/Mahoney Spur, and about 17 acres of

new tidal brackish/salt marsh at East Bahia. Implementation of the proposed project could ultimately result in the restoration of about 300 acres of new tidal brackish/tidal marsh if sea level rise occurs at the lower end of forecast rates and magnitudes. Fringing high salt marsh and transitional grassland suitable for salt marsh harvest mice are expected to develop along the re-graded levees within five years. Suitable California clapper rail habitat is expected to develop within five to ten years, or as long as 15 years, in Central Bahia and Mahoney Spur, where channels are partially pre-constructed. The development of a mature marsh plain and tidal channel system is expected to require 30 to 40 years to develop by natural marsh accretion. About 83 acres of habitat suitable for the California clapper rail is expected to develop within Central Bahia and Mahoney Spur within ten years.

West Bahia, Central Bahia, and Mahoney Spur

Excavation of Interior or “Starter” Channels

Interior or “starter” channels would be excavated within Central Bahia and Mahoney Spur (Figure 6). Starter channels would not represent the expected final channel configuration or cross-sections that are expected to form by long-term natural geomorphic and ecological processes (erosion, deposition, and vegetative sediment stabilization/trapping). These channels would form a rudimentary initial topographic template for tidal flow paths, and would ensure adequate initial tidal circulation after breaching the perimeter levees. The starter channels also would ensure that the main channel configuration would be highly sinuous, providing beneficial high channel density for target wildlife species habitat, including the California clapper rail. The starter channels designed for Central Bahia would be excavated to initiate hydraulic and geomorphic processes to support development of a vegetated tidal marsh. The constructed starter channels would have varying dimensions depending on the existing site grades. No starter channels would be constructed

within West Bahia since the area is subsided below sea level, such that channel patterns are likely to form slowly by differential rates of sediment deposition within a shallow to deep tidal lagoon.

Several configurations and construction methods would be used to create the starter channels. The first 100 feet inboard of the perimeter levee breaches would consist of cross-section dimensions equal to the length of the breaches. The next 100-250 feet would be trapezoidal sections varying between 25 to 40 feet wide at the top and 3.5 to 6 feet deep. The depth and top width would vary, depending on the elevation of the existing grade. The trapezoidal channel section would be excavated through the internal levee between Mahoney Spur and Central Bahia. The remaining length of starter channels would be constructed using a T-section design, which would have a 20 to 25 foot wide top width and 6 foot depth. The bottom part of the T-section would be constructed using a rotary ditcher, while the top part would be constructed using conventional equipment.

Full-size, breach-sized cross-section channels would be excavated for the first 100 feet inboard of the perimeter breaches at five locations: two in Mahoney Spur, one in West Bahia, and two in Central Bahia. The two channels within Mahoney Spur would cut through the internal levee between Central Bahia and Mahoney Spur and terminate at a breach in West Bahia. The channel would then transition to a trapezoidal shape for the next 100-250 feet. The wide channel in Central Bahia from the breach of the levee between Central Bahia and West Bahia would be excavated during Phase 1 and connected to a tidegate to control choked tidal flows to West Bahia. This gate would be removed in Phase 2 to provide a full tidal breach between Central Bahia and West Bahia.

About 19,930 cubic yards of material would be excavated to construct the starter channels. About 11,980 cubic yards of this material would be excavated to construct the full-sized channels and would be sidecasted mechanically to create well-

defined berms. About 7,950 cubic yards would be removed by a rotary ditcher that would spray mud in a thin film onto the constructed tidal marsh plain.

The starter channels would measure 11,350 linear feet, of which 750 feet would be constructed as full-sized trapezoidal channels. The constructed starter channels would direct the flow of tidal waters into the project site to ensure the development of a naturalistic channel network, as well as enhance the ecological values of the proposed action by facilitating drainage and dispersing tidal sediments.

Over the long-term, the channel system would create variation in flow patterns and channel depths, thus increasing the complexity of the marsh morphology and ecological values.

Berms

Material excavated to create the starter channels would be sidecasted adjacent to the channels to create berms in the marsh interior (Figure 7). Berms would be constructed to elevations below Mean Higher High Water (MHHW) (6.0 feet North American Vertical Datum [NAVD]). The total fill associated with the berm construction is approximately 21,711 cubic yards within 7.5 acres of wetlands.

The berms would be placed in the form of unconsolidated piles and not engineered trapezoidal earthen structures. To ensure that the natural widening and scouring of the channels would not be impeded, the toe of each berm would be offset at least 35 feet from the centerline of each channel.

The berms are expected to guide the flow of tidal water in constructed channels, provide sites of early marsh vegetation establishment, and reduce the potential for erosion by blocking wave fetch. They are also expected to provide high tide refugia in the form of tall high marsh vegetation (i.e. gumplant and pickleweed) for endangered and other wildlife species. The berms are not intended to be permanent features and are expected to gradually subside into high marsh or marsh plain as sea level rises and self-compaction occurs.

Pilot Channels

Pilot channels would be excavated through the tidal marsh fringing five breach locations: two in Mahoney Spur, one in West Bahia (connecting to existing channels within Black John Slough), and two in Central Bahia (connecting to the Bahia Homeowners Association channel). The purpose of these channels is to initiate and accelerate the rate of channel scour and to ensure the timely evolution of the full tidal circulation. The pilot channels would be short spurs that extend from the levee breaches into the adjacent tidal marsh, linking them to small existing channels. To minimize impacts to existing tidal marsh habitat, the pilot channels would not cross the entire tidal marsh to connect directly with the main tidal channels. These are the only components of the project that would impact existing tidal marsh.

The pilot channels would be small ditches created using both an excavator and a rotary ditcher to connect each breach to the nearest existing outboard tidal slough or channel. An excavator would excavate a length of 50 feet out from each breach and a rotary ditcher would be used to continue the pilot channel and connect it to the nearest exiting slough or channel. The excavator-created channels would gradually narrow from the breached levee to the rotary ditch-created channels. The initial width would be that of the levee breaches, which vary from a maximum 90-foot width to a 56-foot width at the top. The rotary ditcher-created channels would be approximately 5 feet wide at the top.

The Mahoney Spur pilot channels would extend 20 feet beyond the 50 foot long excavator channel for a total length of 70 feet, to connect with existing tidal channels leading to Black John Slough. The West Bahia pilot channel would be 280 feet long with a rotary ditcher only (no excavator would be used) to connect to the historic sinuous tidal channel with Black John Slough.

At another West Bahia levee breach, an excavator

would excavate a 25 foot channel of decreasing cross-sectional area into the tidal marsh. The pilot channels excavated with a rotary ditcher would total 310 linear feet, and channels excavated with the excavator would be 175 feet, for a total pilot channel length of 485 linear feet.

Two pilot channels are proposed to extend from the two Central Bahia levee breaches and partially enter the adjacent fringing tidal marsh (dominated by alkali bulrush and pickleweed). The southern Central Bahia pilot channel would extend 90 feet into the marsh and terminate at the boundary of the project site with the Bahia Homeowners Association's tidal lands. The first 56 feet would be excavated, and the remaining 40 feet would be constructed with a rotary ditcher. Excavated sediments would be placed within Central Bahia, and rotary ditcher sediments would be dispersed as a diffuse deposit among dormant winter marsh vegetation within 15 feet of the cut. The northern Central Bahia pilot channel would extend up to 160 feet through the adjacent tidal marsh and connect to the outer segment of the Bahia Homeowners Association channel, providing a more direct tidal connection to the Petaluma River. Excavated material would be placed within Central Bahia. Material removed by the excavator would be removed by the excavator bucket and deposited on the interior (nontidal) side of the levees to raise the adjacent interior substrate closer to the target elevation of marsh plain, thereby accelerating the restoration of marsh vegetation.

Material removed by the rotary ditcher would be sprayed outward onto the marsh. This equipment would spray the marsh with a thin layer of material for a radius of 10 to 15 feet, which does not raise the elevation of the adjacent marshes.

Grading and Restoration of the Former RV parking lot

Most of the approximately five-acre upland, formerly used by the residents of the Bahia residential area as a RV parking lot for their

recreational vehicles, would be restored to tidal marsh. Removal of the fill from the former RV parking lot area would convert approximately 3.5 acres of upland to tidal marsh.

An area of fill approximately 100 feet wide would be retained at the bottom of the hill at the end of Bahia Drive to allow for public viewing and to provide a buffer between the new marsh and adjacent development. A strip of land approximately 10 feet wide extending to the existing levee also would be retained to protect the Bahia residential area closed lagoon from potential impacts by wind wave fetch from Central Bahia after this area is opened to tidal action. The former RV parking lot would be lowered to 5-5.5 feet NAVD, which is approximately one foot below MHHW to allow tidal marsh vegetation to restore naturally. Starter channels would be excavated with the rotary ditcher to encourage the development of a dense tidal channel drainage system.

Excavation of the RV parking lot would yield approximately 17,825 cubic yards of material for use in constructing the transitional habitat adjacent to the former dredged disposal area and existing pond as well as a vegetation bench. The material would be transported by truck and placed to create a gentle slope along the southern edge of Central Bahia. This transition habitat would encourage early establishment of vegetation, decrease potential for wind-wave erosion and provide high tide refuge habitat for California clapper rails and other species.

Transitional of High Tide Refugia Habitat and Vegetation Bench

Transitional high-tide refugia habitat would be graded at a very gradual slope (10:1) along the remaining upland of the RV parking lot, the southern edge of Central Bahia adjacent to the former dredge disposal site, and the existing pond (Figure 8). These slopes would provide transitional habitat and reduce the potential for wind wave erosion and increase the extent of this habitat type.

The material to construct the transition zones and high tide refugia would be obtained from lowering the levee adjacent to the former disposal site, from the former RV parking lot and from one of the existing peninsulas at East Bahia. The transition zones would be planted with native vegetation. The total fill associated with the creation of transitional habitat is 17,825 cubic yards within 2.8 acres of wetlands.

A 10-acre vegetation bench would be created inboard of the southeastern corner of the Central Bahia levee (Figure 9). The bench elevation would be raised above the existing elevations from about 1.8 to 2.0 feet NAVD to 4.0 to 4.5 feet NAVD. The total fill associated with the vegetation bench is 6,900 cubic yards within 5 acres of wetlands. Narrow channels would be excavated through the bench slopes using a rotary ditcher to direct tidal water onto the bench and provide habitat for California clapper rails.

Enhancement of Seasonal Wetlands at the Former Disposal Site

Seasonal wetlands would be preserved and enhanced at the 6.7-acre former dredged material disposal site. The existing seasonal wetlands on the former disposal site are dominated by non-native grasses, broadleaf weeds of non-saline habitats, and patches of remnant pickleweed. The former disposal site would be converted to native perennial alluvial grassland and native seasonal wetlands with shallow, wide pools in winter. This seasonal wetland area would be physically modified by excavating several small drainage channels and an approximately one acre area to increase ponding, installing a flashboard-weir to control water flow, lowering the existing levee, placing material adjacent to the levee and grading a gently sloping band of transitional habitat, and eliminating public use on the outboard levee. The re-graded disposal site would be vegetated with a mix of creeping wildrye, meadow barley, common spikerush, salt grass, meadow sedge, native annuals, and pickleweed. The long-term vegetation composition

of the seasonal wetlands would vary with climate cycles. The vegetation is expected to provide potential flood refuge and spring foraging habitat for salt marsh harvest mice. The area also may provide transient flood refuge for California clapper rails.

The existing levee at the former disposal site would be lowered from 13.0 feet NAVD to 11.0 feet NAVD and a narrow lip created with a gradual slope (10:1) down to the marsh plain to provide a continuous tidal marsh gradient including high tide refugia.

Provisions would be made to allow the management of water levels in these enhanced seasonal wetlands by the Marin/Sonoma Mosquito Abatement District.

Enhancement of the Existing One-acre Pond

An approximately one-acre former dredged material decant pond located between the former RV parking lot and dredge material disposal site on West Bahia would be enhanced. An existing breach would be repaired thereby increasing the impoundment of open water and prolonging the duration of ponding beyond the early summer when the pond currently often dries out. A gradual 10:1 slope would be constructed along the outboard (tidal) edge of the pond.

Phased Levee Lowering

The levees around Central Bahia and Mahoney Spur, between Central Bahia and the former dredge disposal area, and between Central Bahia and the one-acre pond would be lowered to approximately MHHW, except for a length of approximately 700 feet that would remain to provide greater protection from wind-wave erosion for the Bahia residential area closed lagoon. The excavated material would be sidecasted on the interior of the levees to establish a broad high marsh gradient with the future marsh plain, providing an important habitat zone that would otherwise not form. The total fill associated with sidecasting the material from the

levee lowering is 15,470 cubic yards within 7.5 acres of wetlands.

The target elevation for the lowered levees would vary approximately +/- 0.5 feet. Excavated material would be placed adjacent to the levee to raise the existing grade from 2.5 feet NAVD to 4.0 to 5.0 feet NAVD. The graded material would be placed adjacent to the levee and would raise the local site elevation approximately 0.5 foot. The levee along the south side of Central Bahia, adjacent to the former Bahia Homeowners Association disposal area and pond would be lowered from approximately 9.0 feet NAVD to 6.0 feet NAVD.

In Phase 2, levee lowering would include excavating the northern levee of West Bahia and the levee between Central Bahia and West Bahia, if needed. No more than 2.0 feet of lowering from approximately 8.0 feet NAVD to 6.0 feet NAVD would be required. Excavated material would be placed inboard of the levee and would partially fill the existing borrow ditches.

Levee lowering to high marsh elevations would dissipate energy from wind waves, provide stable high tide refugia, encourage recruitment of high brackish marsh vegetation in lieu of terrestrial weedy vegetation, eliminate favorable (unflooded) den habitat for terrestrial predators, and reduce efficiency of travel corridors for terrestrial predators by interrupting upland corridors within the tidal marsh.

Phased Breaching of Perimeter Levee

Breaching of the perimeter levees would occur in two phases with breaches to Mahoney Spur and Central Bahia in Phase 1 and the breaches along West Bahia in Phase 2. Delaying breaching in West Bahia is anticipated to minimize adverse impacts to adjacent habitat areas in Rush Creek and Cemetery Marshes and to the tidal marshes along Black John Slough. Phasing likely would minimize the potential for large and sudden changes to the existing tidal hydrology of Black John Slough. Delaying the tidal restoration of West Bahia is

anticipated to allow tidal scour to gradually enlarge Black John Slough. Four breaches would be excavated through the perimeter levee to allow daily tidal action to Mahoney Spur and Central Bahia and to initiate tidal scour along Black John Slough. Black John Slough is anticipated to gradually adjust to the tidal prisms conveyed through the Mahoney Spur breaches.

Phase 1 Breaches

Dimensions for the Central Bahia and Mahoney Spur levee breaches were selected based on their expected long-term equilibrium conditions (Figure 10). The shape and size of the breaches are expected to adjust in response to tidal scour, although their cross-sectional areas and depths have been chosen to avoid significant tidal scour. The volume of material excavated for the levee breaches for Phase 1 would be approximately 1,220 cubic yards.

The northeast breach for Central Bahia would be located as close as possible to the Petaluma River so that sediment-laden water can be efficiently delivered to the breached site to maximize the rate of tidal marsh accretion and re-vegetation in the area of the project site. The southern breach of Central Bahia would be located to form a second center of rapid sediment and vegetation establishment. The southern breach location would be adjacent to the constructed intertidal marsh platform (re-graded RV parking lot fill) and close to established tidal marsh within the Bahia residential area closed lagoon. The levee breaches for Central Bahia would be wide enough to drain the majority of Central Bahia, and a portion of West Bahia after Phase 2 is implemented.

The breaches for Mahoney Spur are designed to drain all of this area and portions of Central Bahia and West Bahia. One breach is at the northeast corner of Mahoney Spur, and another breach is at the northwest corner of the Mahoney Spur perimeter levee on Black John Slough. These connections were selected to create a hydraulically

efficient connection to the Petaluma River, while maximizing the length of Black John Slough that would be subject to scour during Phase 1.

The Central Bahia breach and one of the Mahoney Spur breaches would be 90 feet wide and 10 feet deep with a bottom width of 10 feet. The other Mahoney Spur breach would have a width of 56 feet, bottom width of 5 feet, and a depth of 8.5 feet.

Two water flow control structures (a 48 inch culvert with a slide/flap gate and a 36 inch conveyance) have been installed at the West Bahia levee during this past winter through a permit to the California Department of Fish and Game. These structures will allow limited tidal action and management of interim water levels in West Bahia during Phase 1.

The water control structures and pilot channels are expected to allow for limited circulation in West Bahia that would convey sediments, provide muted tidal habitat, discourage mosquito production, and avoid the risk of inducing rapid changes to the hydrology of Black John Slough, while allowing for gradual scouring and widening of Black John Slough. During this interim condition prior to the initiation of Phase 2, the hydraulic regime within West Bahia would consist of a muted tidal range (up to approximately 1.0 foot) with typical water depths of up to 5.0 to 6.0 feet. Prior to the initiation of Phase 2, the Marin/Sonoma Mosquito Abatement District would manage the water levels by adjusting the setting of the flow control structures.

Phase 2 Breaches

In Phase 2, a maximum of four breaches between the perimeter levee of West Bahia (adjacent to existing tidal marsh habitat) would be constructed, with an additional internal breach between West Bahia and Central Bahia. Construction of the breaches would occur in West Bahia after tidal scour enlarges Black John Slough sufficiently to accommodate the full tidal prism of West Bahia in the muted management regime. It is anticipated that Black John Slough needs to deepen from its existing bed elevation of 2.0 to 6.0 feet NAVD and

its cross-sectional area to increase from 220 square feet to about 1300 square feet. It is expected that this would occur within three years, but the increase in cross-sectional area could take up to five years. Therefore, Phase 2 is expected to be implemented two to five years after Phase 1 is implemented.

All of the West Bahia levee breaches would be trapezoidal with 3:1 side slopes. One of the breaches along the perimeter levee would have a top width of 90 feet, bottom width of 10 feet and a depth of 10 feet. The other two breaches in the perimeter levee would have a top width of 56 feet, bottom width of 5 feet, and depth of 8.5 feet. The dimensions of the Phase 2 breaches are based on the expected long-term equilibrium geometry. Levees not lowered during Phase 1 would provide construction access to the Phase 2 levee breach locations. The total fill associated with sidecasting of the excavated material during Phase 2 levee breaching is 5,840 cubic yards within 5.3 acres of wetlands.

Establishment of Vegetation in the Transition and High Tide Refugial Habitat

The graded gradually sloping substrates along the former dredged disposal site, one-acre pond, former RV lot, and two peninsulas bordering the Bahia Homeowners Association channel and the Petaluma River would be managed to minimize the risk of rapid invasion by weedy vegetation such as perennial pepperweed (*Lepidium latifolium*) from the restored MHHW line to the limit of tidal flooding. These transition zones between tidal marsh and terrestrial grassland or scrub would be supplied with very low initial transplant densities of perennial grasses and shrubs to act as founder populations which are expected to spread gradually and form a heterogeneous native-dominated vegetation within 10 to 15 years.

Vegetative species used for this high tidal marsh transition zone would include creeping wildrye (*Leymus triticoides*) with gumplant (*Grindelia stricta*) planted near the MHHW line. Elements of

nearby oak woodlands (coastal live oak, toyon, and coyote brush) may be sparsely distributed in the upper end of the zone. Habitat functions of this zone would include suppressing invasion by weedy vegetation, and providing high tide flood refuge for resident marsh wildlife and foraging habitat for perching birds.

Construction of Ditch Blocks

In Phase 2, three ditch blocks would be constructed along the West Bahia borrow ditch: two along the outer levee and one along the levee between Central Bahia and West Bahia (Figure 11). No ditch blocks would be placed in Central Bahia and Mahoney Spur because there are no significant borrow ditches on the inboard side of the Central Bahia and Mahoney Spur levees. The purpose of the ditch blocks is to inhibit the existing ditches from capturing the tidal flows, which would impede re-establishment of the historic channel network. The constructed ditch blocks would facilitate development of a more naturalistic, complex, irregular, dense marsh channel morphology and provide the greatest ecological values associated with natural tidal channel patterns.

Material excavated from breaching the West Bahia levees would be used to create the ditch blocks. The material would be placed in the adjacent borrow ditches. The ditch blocks would be generally at elevation 6.0 feet NAVD, which is approximately three feet above the existing grade of 3.0 feet NAVD, with about 5:1 side slopes. The top width of the ditch blocks would be approximately 60 feet, with the bottom width depending on the bottom width of the existing ditch. The total fill associated with the construction of the ditch blocks is 3,300 cubic yards within 0.5 acres of wetlands.

East Bahia Peninsulas

East Bahia is composed of three peninsulas created more than 30 years ago by placing fill (generated from grading nearby hills and excavation of adjacent marshes) in tidal marsh to create building

pads for planned residential development. East Bahia comprises about 55 acres owned by the project proponent. Implementation of the proposed project would result in the restoration of tidal wetlands on the westernmost and easternmost peninsulas, and the creation of seasonal wetlands on the peninsula in between the other two peninsulas.

Tidal Marsh Restoration

About 8.8 acres of the 16.6-acre peninsula adjacent to the Bahia Homeowners Association channel would be lowered to the existing elevation of the adjacent tidal marsh, which is approximately one foot below MHHW (about +6.3 NAVD). Within this lowered area on the peninsula, approximately nine acres of new tidal marsh and transitional grassland/scrub habitat would be restored.

To restore tidal marsh, the elevation of the western portion of the peninsula adjacent to the Bahia Homeowners Association channel would be lowered from 7 to 8 feet NAVD to 5.8 feet NAVD sloping down to 5.3 feet NAVD adjacent to the existing tidal marsh. The constructed upper intertidal marsh terrace in existing fill would be tidally drained by four constructed narrow tidal channels connecting to the fringing tidal marsh at the boundary of the project site with the Bahia Homeowners Association channel. The trunks of three of the constructed channels along the Bahia Homeowners Association channel would extend through the graded terrace perpendicular to the shoreline and Bahia Homeowners Association channel, and branches at the heads of the constructed channels would extend irregularly parallel with the shoreline. The trunk of each channel would extend up to 50 feet into existing fringing tidal marsh dominated by alkali bulrush and pickleweed. The constructed channel at the northern end of the western peninsula would be a single, slightly sinuous unbranched channel connected directly with the Bahia Homeowners Association channel. All channels within the existing tidal marsh would be constructed with a rotary ditcher only. Channel segments excavated

within the graded fill terrace may be excavated to alternative larger trapezoidal channel dimensions by an excavator, with 3:1 side slopes. A berm with a 20:1 slope lower edge approximately 60 feet wide and a 5:1 side slope facing the Bahia Homeowners Association channel fringing marsh would be constructed along the crest of the western peninsula to buffer the constructed new marsh from recreational activities within the Bahia Homeowners Association open-water lagoon. The berm and toe slope, following re-vegetation, would form the transitional habitat and flood refuge habitat for the constructed marsh. The crest of the berm would be 13 feet NAVD.

A similar marsh terrace and channel system would be constructed along the eastern peninsula of East Bahia, adjacent to the Green Point (Toy) Marsh. Three rotary ditch-constructed channels would connect to a remnant borrow/drainage ditch that connects with the Petaluma River. These constructed channels would extend parallel with the peninsula long axis north to south along the graded intertidal terrace. The mouths of the channels would extend approximately 50 to 100 feet into the adjacent tidal marsh to connect with the remnant borrow ditch.

Approximately 5.3 acres of tidal marsh would be restored on the eastern peninsula adjacent to the Petaluma River tidal marshes by lowering an area approximately 1,500 feet long by 150 wide to approximately one foot below existing tidal marsh elevation, excavating channels and grading a transition zone. A portion of the 15-acre eastern peninsula also would be retained and enlarged as a levee to maintain a buffer between the recreational activities within the Bahia Homeowners Association open-water lagoon and restored tidal marsh. The outer edge of the peninsula would be removed and the existing elevation lowered from 9.0 feet NAVD to 5.8 feet NAVD, gently sloping to 5.3 feet NAVD as it meets the existing tidal marsh.

Three pilot channels would be excavated and extend 80 to 100 feet from the new marsh plain through the

adjacent fringing marsh and connect with an existing tidal channel that parallels the peninsula. Construction of channels within the existing tidal marsh would be limited to a rotary ditcher and dispersive sidecasting of excavated sediment. Channel sections within the re-graded peninsula terrace may be constructed with an excavator. The main channels would connect to the existing channel through the new marsh plain and the existing tidal marsh. The northern main channel would be 600 feet long, the middle channel 750 feet long, and the southern channel 700 feet long for a total length of 1,750 feet. About 18 small branch channels would be excavated through the new constructed marsh plain and connected with the main channels. These channels would be excavated with a rotary ditcher or excavator and have a top width of five feet and depth of approximately four feet. About 1,500 feet of channels would be excavated. The purpose of all of the channels would be to provide adequate circulation of tidal water within the new marsh and to enhance channelized marsh habitat for California clapper rails. The main channels would gradually lessen from a top width of up to 36 feet, a depth of 4.5 feet, and a bottom width of 1.5 feet.

About 30,325 cubic yards of material would be excavated from the eastern peninsula to create the new marsh plain and 2,400 cubic yards for channels for a total of 32,725 cubic yards. Of the 32,725 cubic yards, 4,900 cubic yards would be transported to the central peninsula where the material would be reused to create seasonal wetland and upland habitat on the central peninsula. Approximately 16,600 cubic yards resulting in 3.8 acres of wetland fill would be used on the eastern peninsula to enhance the constructed embankments. The remainder of the excavated material would be placed along the southern shore of the Bahia Homeowners Association open-water lagoon and on the hill by the western peninsula.

The eastern side of the western peninsula adjacent to a Pacific Gas & Electric (PG&E) powerline easement would be constructed to 13 feet NAVD.

A 50-foot wide strip of land under the powerlines would not be used to avoid the PG&E easement. Some material may be placed on the Novato Sanitary District easement lands, but would not interfere with the functioning of the pump or access to the area. Approximately 14,800 cubic yards of excavated material would be transported to Central Bahia where it will be placed in 1.4 acres of wetlands to create vegetation bench habitat in the southeast corner of Central Bahia and transition habitat along the levee between Central Bahia and Bahia Homeowners Association property.

The central peninsula would not be restored to tidal marsh because the area is separated from the Petaluma River and Black John Slough, the sources of tidal waters, by the Bahia Homeowners Association open-water lagoon. Therefore, the central peninsula would be maintained and enhanced as seasonal wetlands and perennial grassland. A total of 3.2 acres of new and enhanced-existing seasonal wetlands would be provided on the central peninsula and a total of 1.4 acres of existing seasonal wetlands would be lost, resulting in a net gain of 1.8 acres.

Approximately 4,900 cubic yards excavated from the eastern peninsula would be used to create seasonal wetlands on the central peninsula and 11,800 cubic yards excavated from the eastern peninsula would be placed within 0.3 acres of wetland along the southern shoreline to create uplands. Depressions also would be excavated to create seasonal wetlands near the pond at the southeast corner of the property. The existing five-acre pond, south of the eastern peninsula, would be preserved.

To protect adjacent property owners from potential flooding during extreme storms or high tides, the embankment north of the existing pond would remain in place. Any low spots in this bank would be raised and if necessary the bank may be expanded. In addition, the existing seasonal wetlands southwest of the existing pond south of the levee also would be preserved.

Project Purpose: The basic project purpose is to restore historic tidal marsh communities and associated non-tidal seasonal wetlands adjacent to the Petaluma River. The project would expand habitat for resident and migratory wetland wildlife species, particularly the California clapper rail and salt marsh harvest mouse.

3. COMPLIANCE WITH VARIOUS FEDERAL LAWS:

National Environmental Policy Act of 1969 (NEPA): The Corps will assess the environmental impacts of the proposed action in accordance with the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. Section 4371 et. seq.), the Council on Environmental Quality's Regulations (40 C.F.R. Parts 1500-1508), and the Corps' Regulations (33 C.F.R. Part 230 and Part 325, Appendix B). Unless otherwise stated, the Environmental Assessment will describe only the impacts (direct, indirect, and cumulative) resulting from activities within the Corps' jurisdiction. The documents used in the preparation of the Environmental Assessment will be on file with the U.S. Army Corps of Engineers, San Francisco District, Regulatory Branch, 1455 Market Street, San Francisco, California 94103-1398.

Endangered Species Act of 1973 (ESA): Section 7 of the Endangered Species Act requires formal consultation with the U.S. Fish and Wildlife Service (FWS) and/or the National Marine Fisheries Service (NMFS) if a Corps permitted project may adversely affect any Federally listed threatened or endangered species or its designated critical habitat. The Corps initiated Section 7 consultation with the U.S. Fish and Wildlife Service on February 2, 2006 for the federally-listed endangered California clapper rail (*Rallus longirostris*) and salt marsh harvest mouse (*Reithrodontomys raviventris*).

Magnuson-Stevens Fisheries Conservation and Management Act: NMFS and several interagency fisheries councils have designated specific water bodies as Essential Fish Habitat (EFH) in accordance

with the Magnuson-Stevens Fisheries Conservation and Management Act. The Corps will consult with NMFS regarding EFH concerns associated with this proposal have been identified.

Clean Water Act of 1972 (CWA):

a. Water Quality: Under Section 401 of the Clean Water Act (33 U.S.C. Section 1341), an applicant for a Corps permit must first obtain a State water quality certification before a Corps permit may be issued. No Corps permit will be granted until the applicant obtains the required water quality certification. The Corps may assume a waiver of water quality certification if the State fails or refuses to act on a valid request for certification within 60 days after the receipt of a valid request, unless the District Engineer determines a shorter or longer period is reasonable for the State to act.

Those parties concerned with any water quality issue that may be associated with this project should write to the Executive Officer, California Regional Water Quality Control Board, San Francisco Bay Region, 1515 Clay Street, Suite 1400, Oakland, California 94612 by the close of the comment period of this Public Notice.

b. Alternatives: Evaluation of this proposed activity's impact includes application of the guidelines promulgated by the Administrator of the Environmental Protection Agency under Section 404(b)(1) of the Clean Water Act (33 U.S.C. Section 1344(b)). An evaluation has been made by this office under the guidelines and it was determined that the proposed project is water dependent.

Coastal Zone Management Act of 1972 (CZMA): Section 307 of the Coastal Zone Management Act requires the applicant to certify that the proposed project is consistent with the State's Coastal Zone Management Program, if applicable. The proposed project is within the Coastal Zone.

National Historic Preservation Act of 1966 (NHPA): Based on a review of survey data on file

with various City, State and Federal agencies, no historic or archeological resources are known to occur in the project vicinity. If unrecorded resources are discovered during construction of the project, operations will be suspended until the Corps completes consultation with the State Historic Preservation Office (SHPO) in accordance with Section 106 of the National Historic Preservation Act.

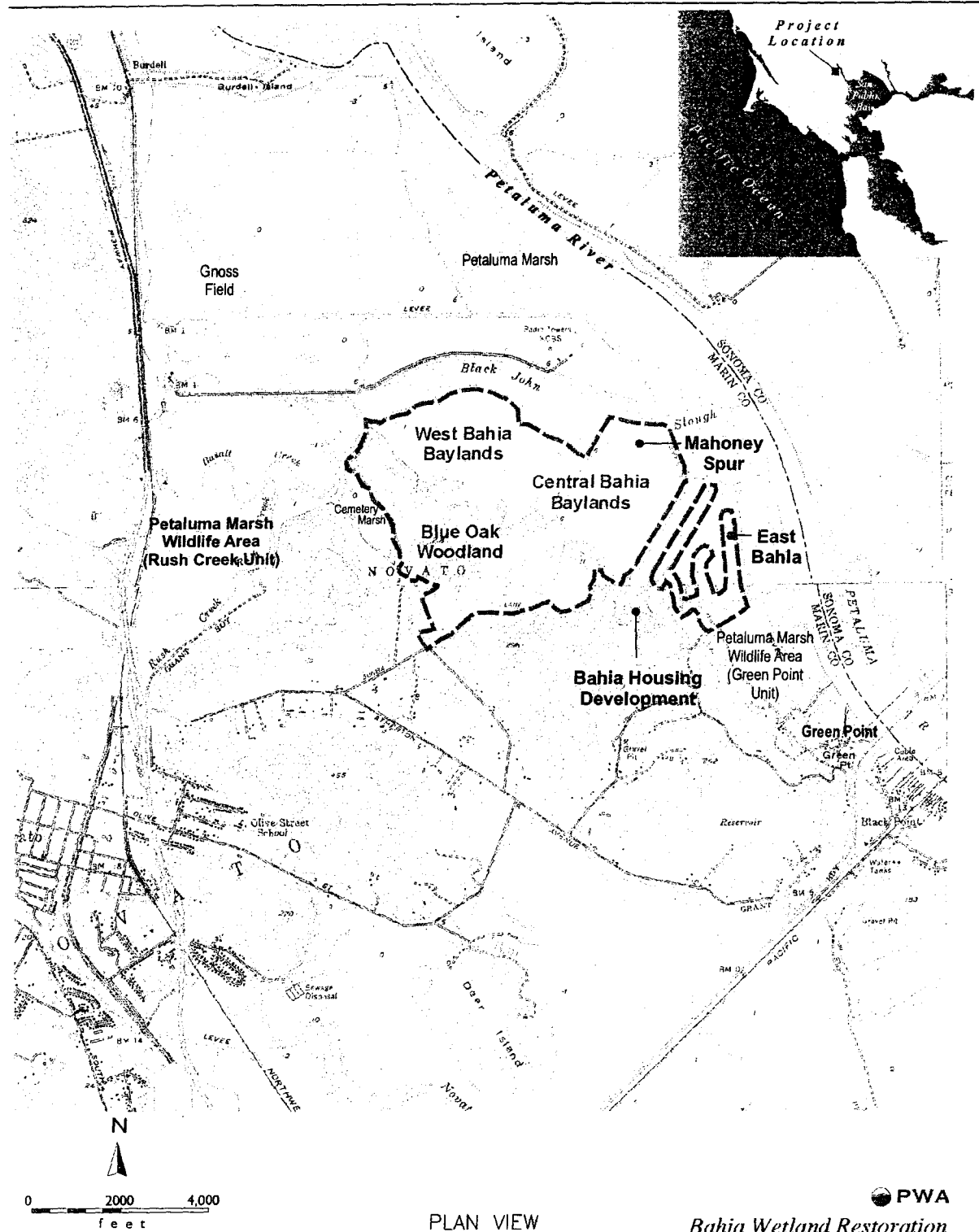
4. PUBLIC INTEREST EVALUATION: The decision whether to issue a permit will be based on an evaluation of the probable impact, including cumulative impact, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits that reasonably may be expected to accrue from the proposed activity must be balanced against its reasonably foreseeable detriments. All factors that may be relevant to the proposal will be considered, including its cumulative effects. Among those factors are: conservation, economics, aesthetics, general environmental concerns, wetlands, historical properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people.

5. CONSIDERATION OF COMMENTS: The Corps of Engineers is soliciting comments from the public, Federal, State and local agencies and officials, Indian Tribes, and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps to determine whether to issue, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments

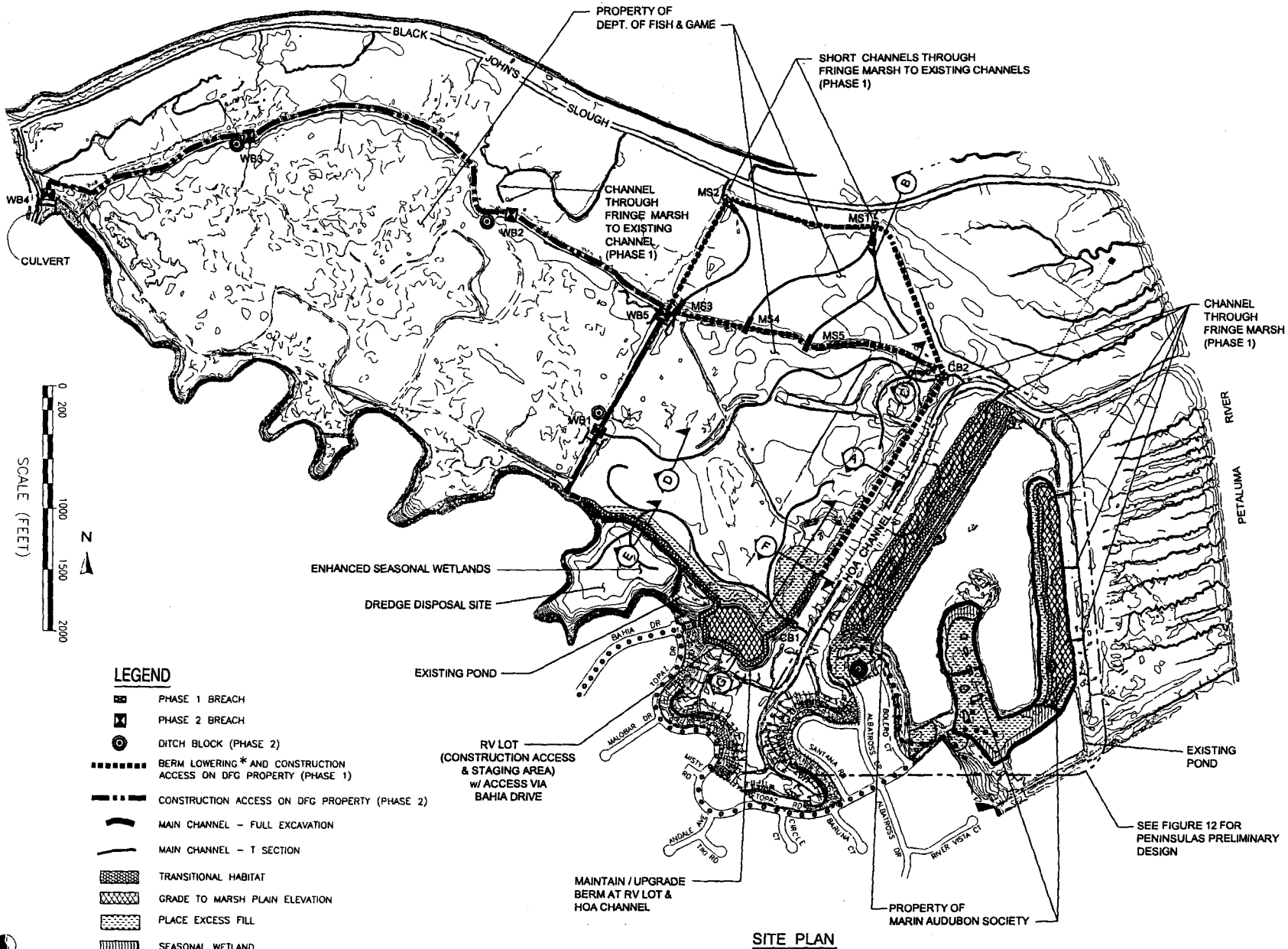
are also used to determine the need for a public hearing and to determine the overall public interest in the proposed activity.

6. SUBMISSION OF COMMENTS: Interested parties may submit, in writing, any comments concerning this activity. Comments should include the applicant's name and the number and the date of this Public Notice, and should be forwarded so as to reach this office within the comment period specified on Page 1. Comments should be sent to the U.S. Army Corps of Engineers, San Francisco District, Regulatory Branch, 1455 Market Street, San Francisco, California 94103-1398. It is the Corps' policy to forward any such comments that include objections to the applicant for resolution or rebuttal. Any person may also request, in writing, within the comment period of this Public Notice that a public hearing be held to consider this application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing. Additional details may be obtained by contacting the applicant whose name and address are indicated in the first paragraph of this Public Notice or by contacting Katerina Galacatos of our office at telephone 415-503-6778 or email:Katerina.Galacatos@usace.army.mil. Details on any changes of a minor nature that are made in the final permit action will be provided upon request.

SFO:1689_Bahia_WetlandsTask02_PreliminaryDesignTask2.2_Project_AltisMemoFiguresNewFigs-LocationMap.cdr



<p>PURPOSE: HABITAT RESTORATION</p> <p>DATUM: NAVD88</p> <p>ADJACENT PROPERTY OWNERS:</p> <ol style="list-style-type: none"> 1. BAHIA HOMEOWNERS ASSOCIATION 2. CALIFORNIA STATE LANDS COMMISSION 3. MARIN COUNTY OPEN SPACE DISTRICT 	<p>MARIN AUDUBON SOCIETY (MAS)</p> <p>PO BOX 599</p> <p>MILL VALLEY, CA 94942</p> <p>CA DEPT. OF FISH & GAME(DFG)</p> <p>PO BOX 47</p> <p>YOUNTVILLE, CA 94558</p>	<p>figure 1</p> <p>REGIONAL & PROJECT LOCATION</p> <p>IN: LOWER PETALUMA RIVER</p> <p>AT: NOVATO COUNTY OF: MARIN</p> <p>STATE: CA DATE 05/04/05</p> <p>APPLICATION BY: MAS & DFG</p>
--	--	--



PLAN VIEW

Bahia Wetland Restoration



figure 2

PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

MARIN AUDUBON SOCIETY (MAS)

PO BOX 599

MILL VALLEY, CA 94942

CA DEPT. OF FISH & GAME(DFG)

PO BOX 47

YOUNTVILLE, CA 94558

PROPOSED PRELIMINARY DESIGN FOR BAYLANDS

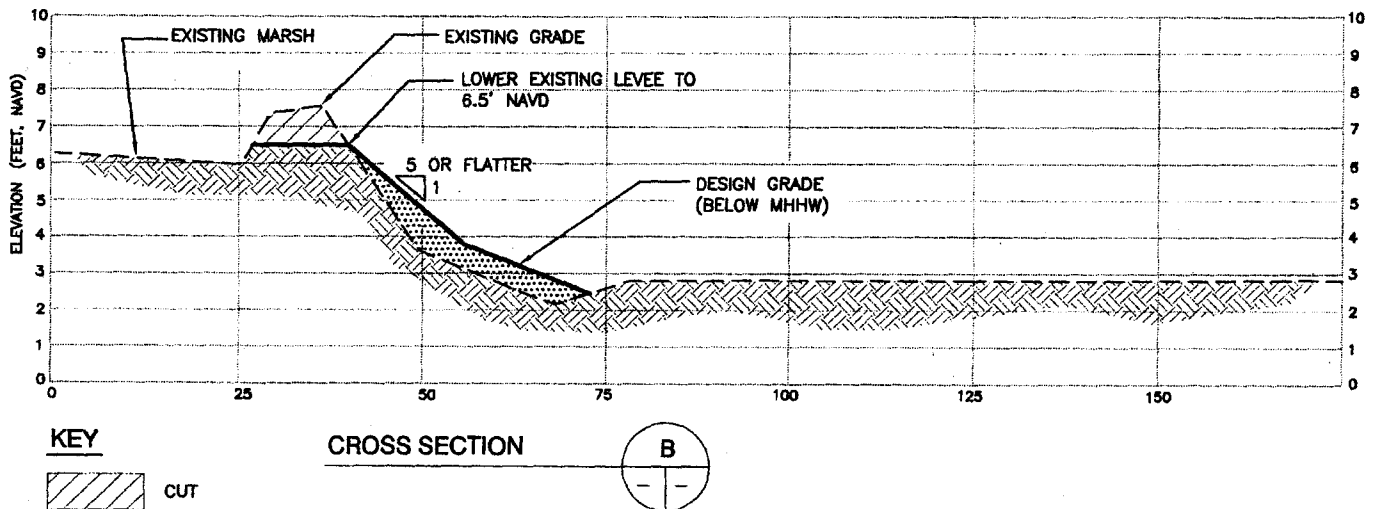
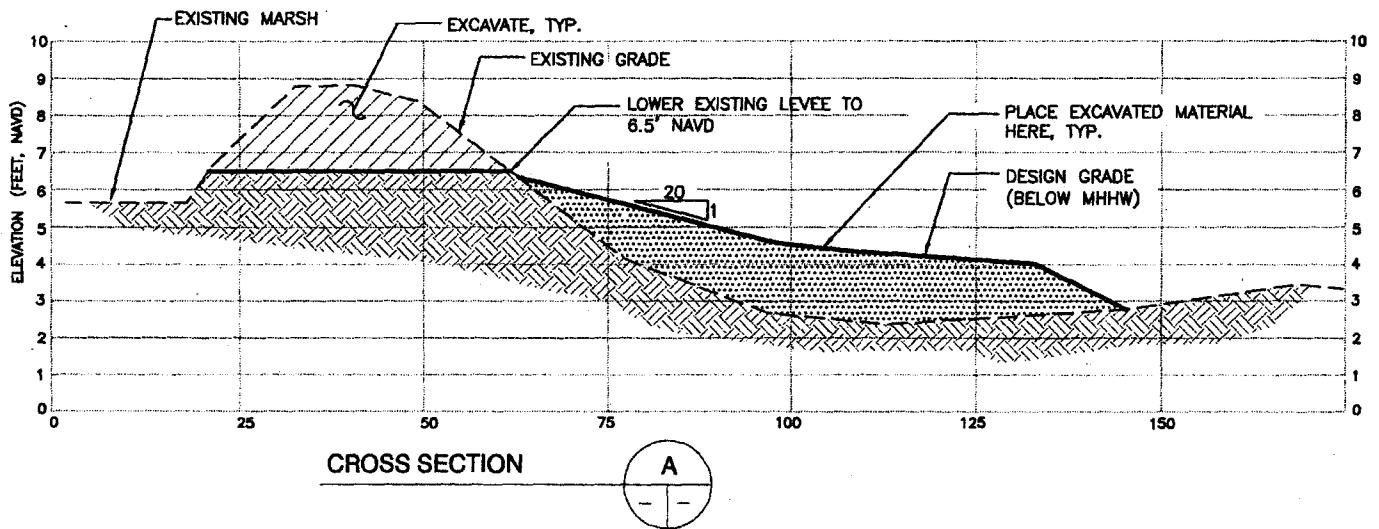
IN: LOWER PETALUMA RIVER

AT: NOVATO COUNTY OF: MARIN

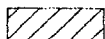


STATE: CA

DATE 04/5/07

APPLICATION BY: MAS & DFG



KEY

-  CUT
-  FILL
-  EXISTING GROUND

SECTION VIEW

 **PWA**
Bahia Wetland Restoration

PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

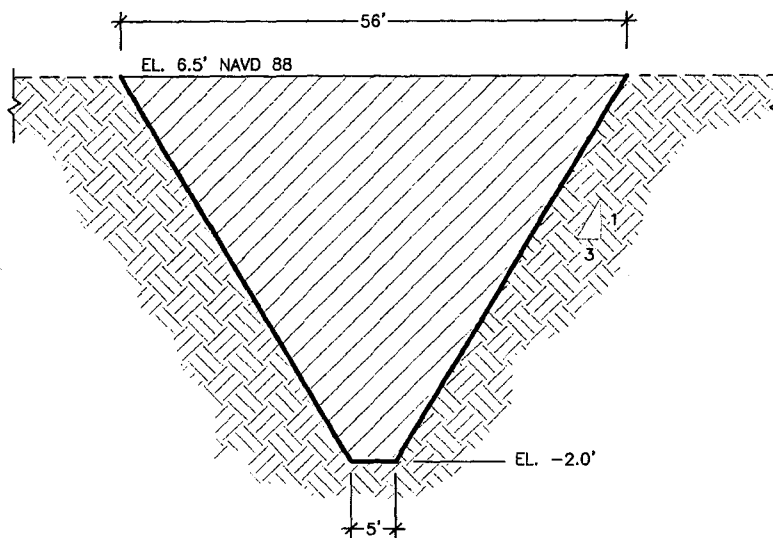
MARIN AUDUBON SOCIETY (MAS)
PO BOX 599
MILL VALLEY, CA 94942

CA DEPT. OF FISH & GAME(DFG)
PO BOX 47
YOUNTVILLE, CA 94558

figure 3

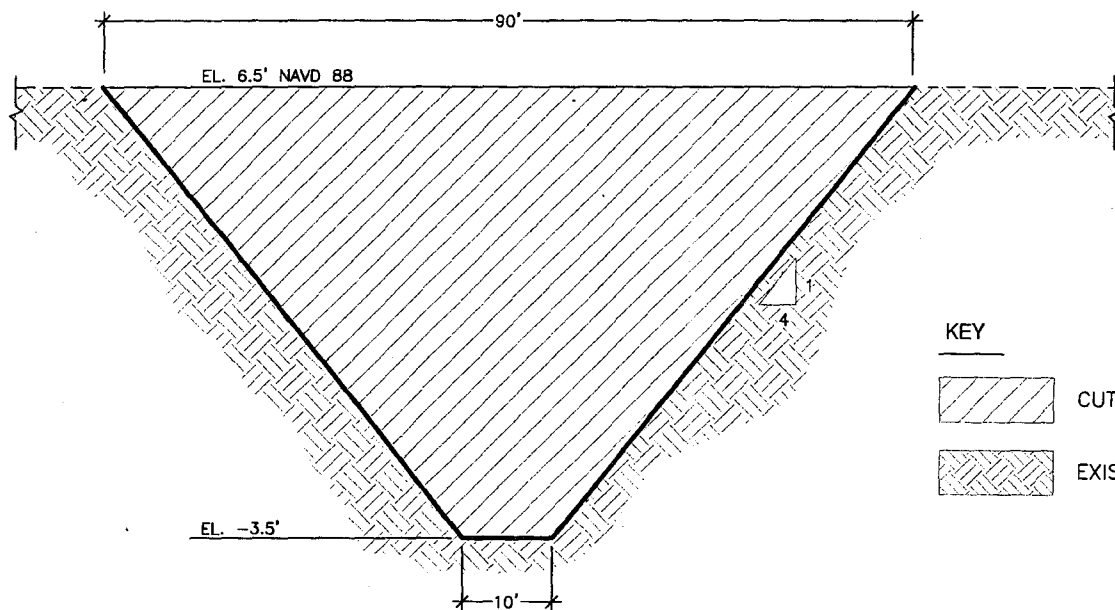
SCHEMATIC OF LEVEE LOWERING

IN: LOWER PETALUMA RIVER
AT: NOVATO COUNTY OF: MARIN
STATE: CA DATE 06/21/07
APPLICATION BY: MAS & DFG



BREACH CB1, MS1, MS3, MS4, MS5

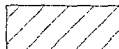
SCALE VERT: 1" = 4'
HORIZ: 1" = 20'



BREACH CB2, MS2

SCALE VERT: 1" = 4'
HORIZ: 1" = 20'

KEY

 CUT

 EXISTING GROUND

SECTION VIEW

 **PWA**
Bahia Wetland Restoration

PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

MARIN AUDUBON SOCIETY (MAS)
PO BOX 599
MILL VALLEY, CA 94942

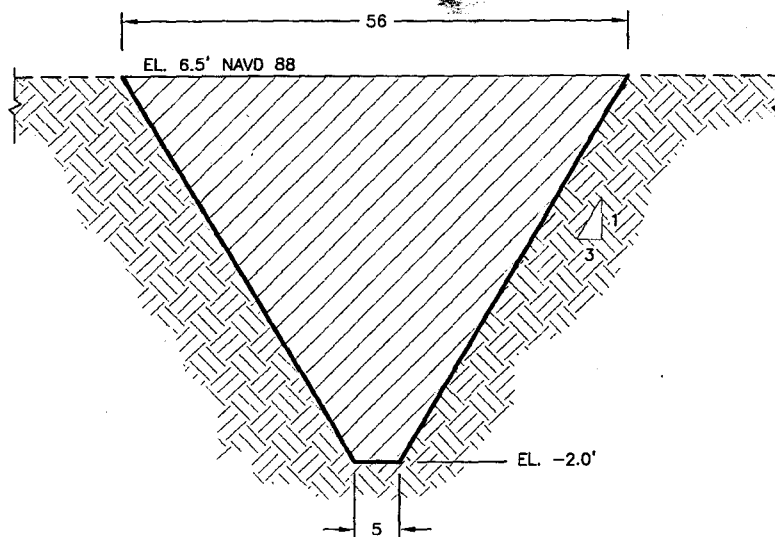
CA DEPT. OF FISH & GAME(DFG)
PO BOX 47
YOUNTVILLE, CA 94558

figure 4

SCHEMATIC OF LEVEE BREACHS-PHASE 1

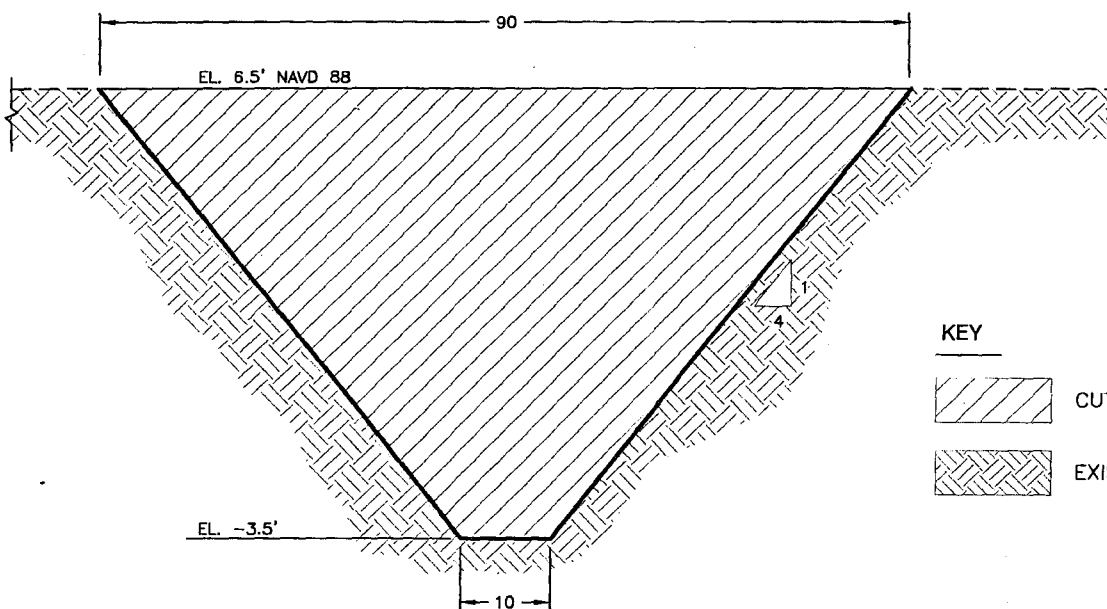
IN: LOWER PETALUMA RIVER
AT: NOVATO COUNTY OF: MARIN
STATE: CA DATE 04/17/07
APPLICATION BY: MAS & DFG

Q:\Projects\1689_Bahia Drawings\perm\140\1689_N4 and z.dwg 4-17-07 04:00:58 PM r.froo



BREACH WB1, WB3, WB4 & WB5

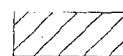
SCALE VERT: 1"= 4'
HORIZ: 1"= 20'



BREACH WB2

SCALE VERT: 1"= 4'
HORIZ: 1"= 20'

KEY



CUT



EXISTING GROUND

SECTION VIEW

Bahia Wetland Restoration



figure 5

SCHEMATIC OF LEVEE BREACHES
AT WEST BAHIA - PHASE 2

IN: LOWER PETALUMA RIVER
AT: NOVATO COUNTY OF: MARIN
STATE: CA DATE 01/25/07
APPLICATION BY: MAS & DFG

PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

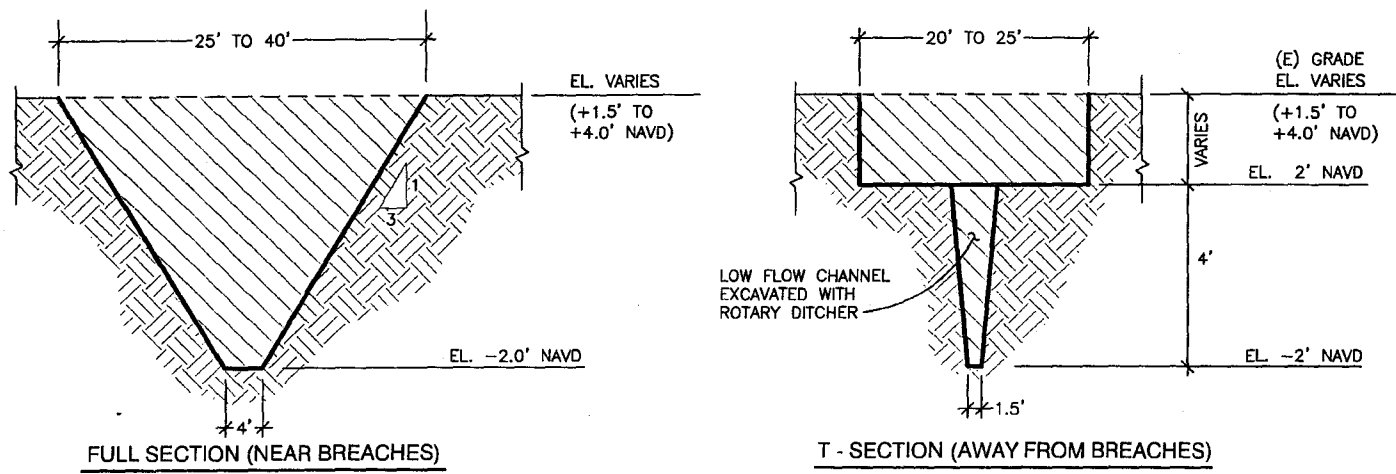
ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

MARIN AUDUBON SOCIETY (MAS)
PO BOX 599
MILL VALLEY, CA 94942

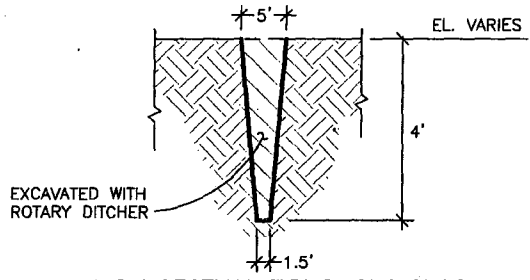
CA DEPT. OF FISH & GAME(DFG)
PO BOX 47
YOUNTVILLE, CA 94558

Q:\Projects\1689_Bahia Drawings\permit\1689_404\1689_fig_N6.dwg 9-29-06 03:04:53 PM r.frolo



TYPICAL SECTIONS AT STARTER CHANNELS

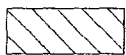

SCALE VERT: 1"= 4'
HORIZ: 1"= 20'



TYPICAL SECTION AT PILOT CHANNELS

SCALE VERT: 1"= 4'
HORIZ: 1"= 20'

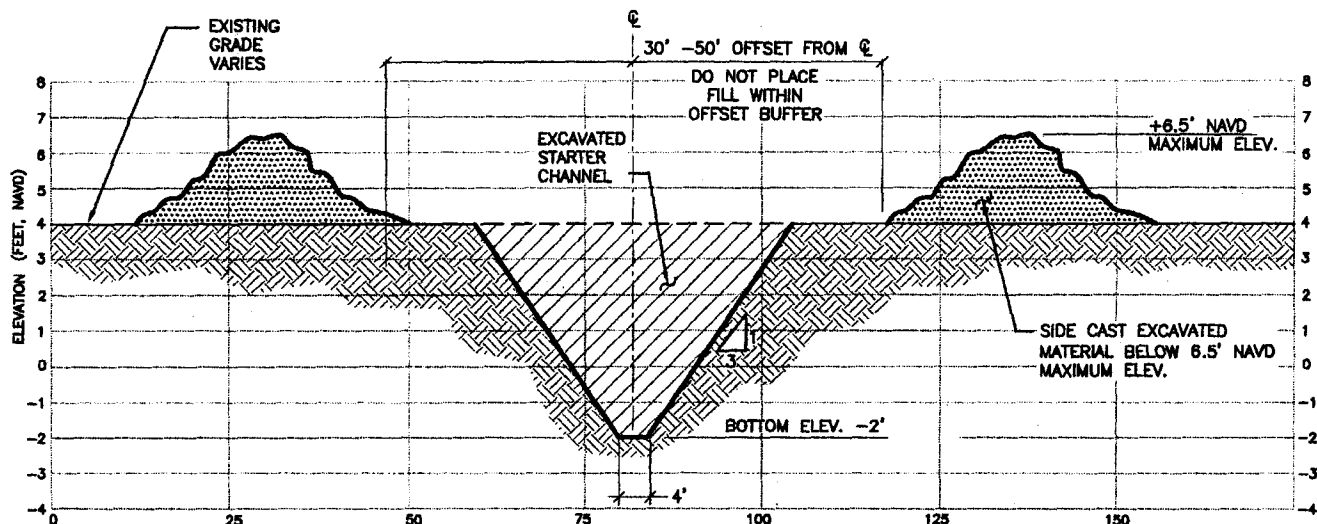
KEY

-  DIMENSIONS OF STARTER CHANNEL
-  EXISTING GROUND

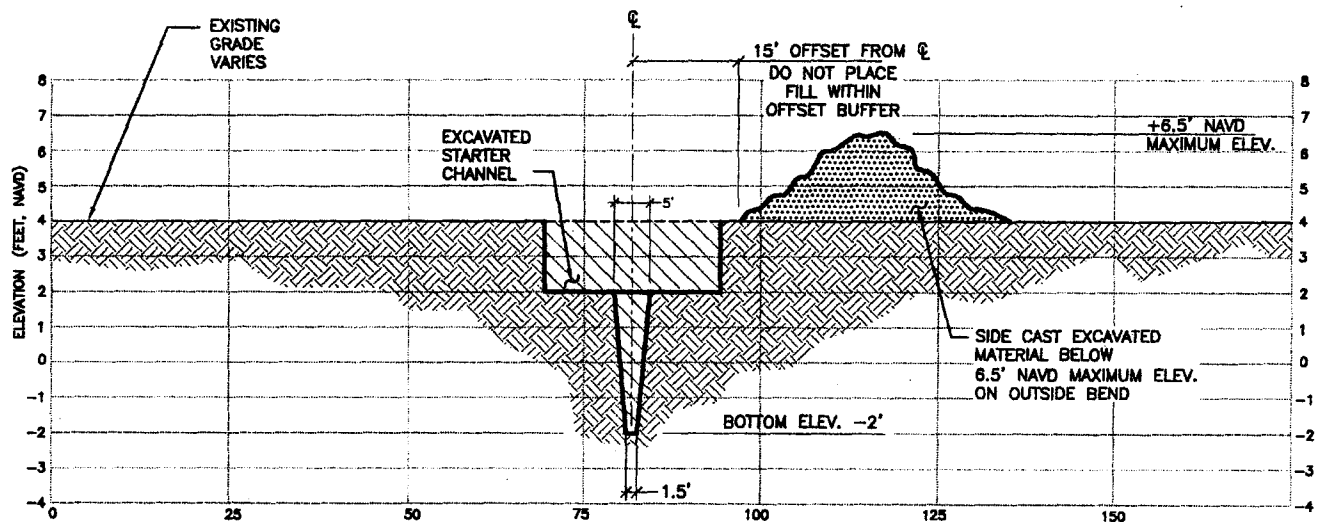
SECTION VIEW

 **PWA**
Bahia Wetland Restoration

<p>PURPOSE: HABITAT RESTORATION</p> <p>DATUM: NAVD88</p> <p>ADJACENT PROPERTY OWNERS:</p> <ol style="list-style-type: none">1. BAHIA HOMEOWNERS ASSOCIATION2. CALIFORNIA STATE LANDS COMMISSION3. MARIN COUNTY OPEN SPACE DISTRICT	<p>MARIN AUDUBON SOCIETY (MAS) PO BOX 599 MILL VALLEY, CA 94942</p> <p>CA DEPT. OF FISH & GAME(DFG) PO BOX 47 YOUNTVILLE, CA 94558</p>	<p><i>figure 6</i></p> <p>SCHEMATIC OF CHANNEL SECTIONS</p> <p>IN: LOWER PETALUMA RIVER AT: NOVATO COUNTY OF: MARIN STATE: CA DATE 09/29/06 APPLICATION BY: MAS & DFG</p>
--	--	---






UNCONTROLLED BERM CROSS SECTION
FULL SECTION CHANNEL



UNCONTROLLED BERM CROSS SECTION
T-SECTION CHANNEL



KEY

-  CUT
-  FILL
-  EXISTING GROUND

NOTES:

1. 1"± TOLERANCE, UNLESS OTHERWISE NOTED
2. AVERAGE GRADE TOLERANCE = 0.5'
3. BERM TO BE GRADED TO DESIGN DIMENSIONS BUT NOT COMPACTED.



SECTION VIEW

Bahia Wetland Restoration

PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

MARIN AUDUBON SOCIETY (MAS)
PO BOX 599
MILL VALLEY, CA 94942

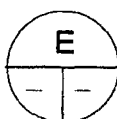
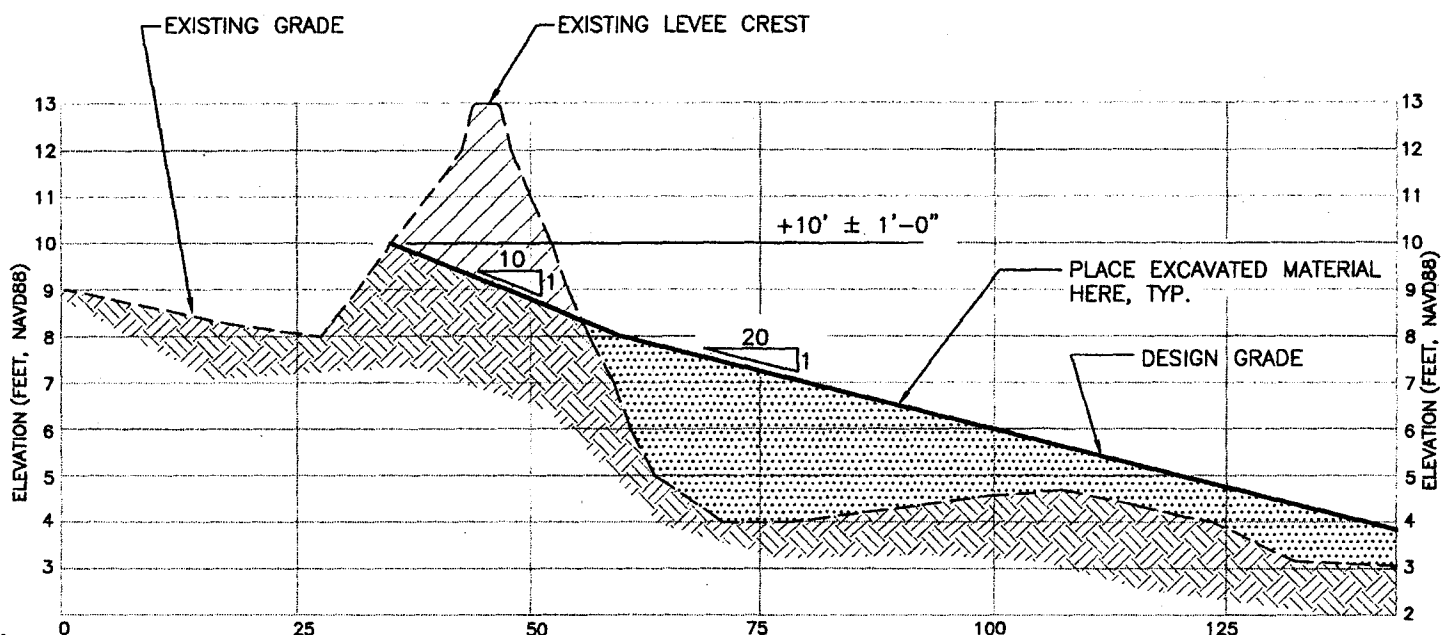
CA DEPT. OF FISH & GAME(DFG)
PO BOX 47
YOUNTVILLE, CA 94558

figure 7

SCHEMATIC OF
STARTER CHANNELS & BERMS

IN: LOWER PETALUMA RIVER
AT: NOVATO COUNTY OF: MARIN
STATE: CA DATE 06/21/07
APPLICATION BY: MAS & DFG

Q:\Projects\1889_Bahia\Drawings\permit_404\1889_fig N8.dwg 6-21-07 02:23:37 PM r.frao



CROSS SECTION - TRANSITIONAL HABITAT
(AT EXISTING SEASONAL WETLANDS)

SCALE VERT: 1"= 4'
HORIZ: 1"= 20'

KEY

- CUT
- FILL
- EXISTING GROUND

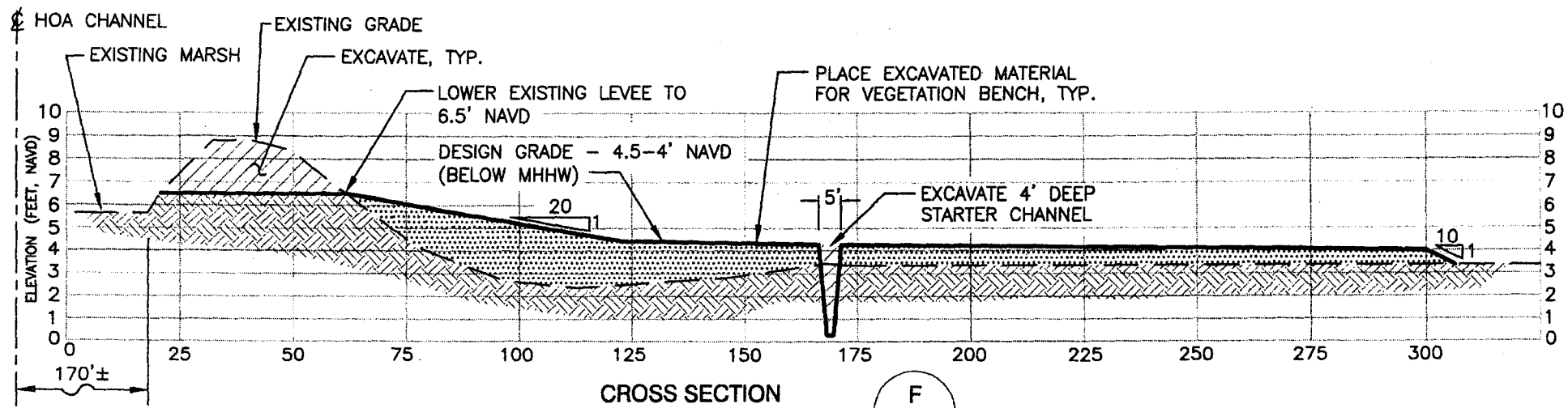
SECTION VIEW

Bahia Wetland Restoration

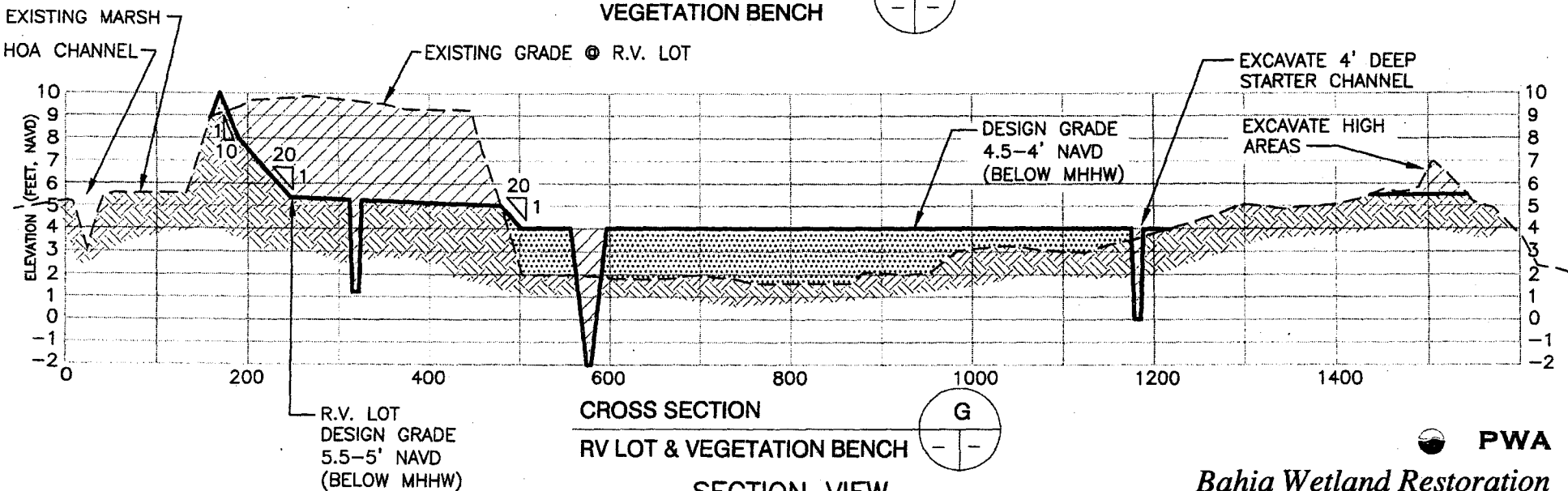
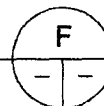


<p>PURPOSE: HABITAT RESTORATION</p> <p>DATUM: NAVD88</p> <p>ADJACENT PROPERTY OWNERS:</p> <ol style="list-style-type: none">1. BAHIA HOMEOWNERS ASSOCIATION2. CALIFORNIA STATE LANDS COMMISSION3. MARIN COUNTY OPEN SPACE DISTRICT	<p>MARIN AUDUBON SOCIETY (MAS) PO BOX 599 MILL VALLEY, CA 94942</p> <p>CA DEPT. OF FISH & GAME(DFG) PO BOX 47 YOUNTVILLE, CA 94558</p>	<p><i>figure 8</i></p> <p>SCHEMATIC OF TRANSITIONAL HABITAT</p> <p>IN: LOWER PETALUMA RIVER AT: NOVATO COUNTY OF: MARIN STATE: CA DATE 06/21/07 APPLICATION BY: MAS & DFG</p>
--	--	---

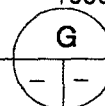
g:\Projects\1689_Bahia\Drawings\RWQCB_40\permit\Temp\A\Changes\1689_VEGBENCH_N9.dwg 6-21-07 02:10:56 PM r.frao



CROSS SECTION
VEGETATION BENCH



CROSS SECTION
RV LOT & VEGETATION BENCH
SECTION VIEW



Bahia Wetland Restoration

PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

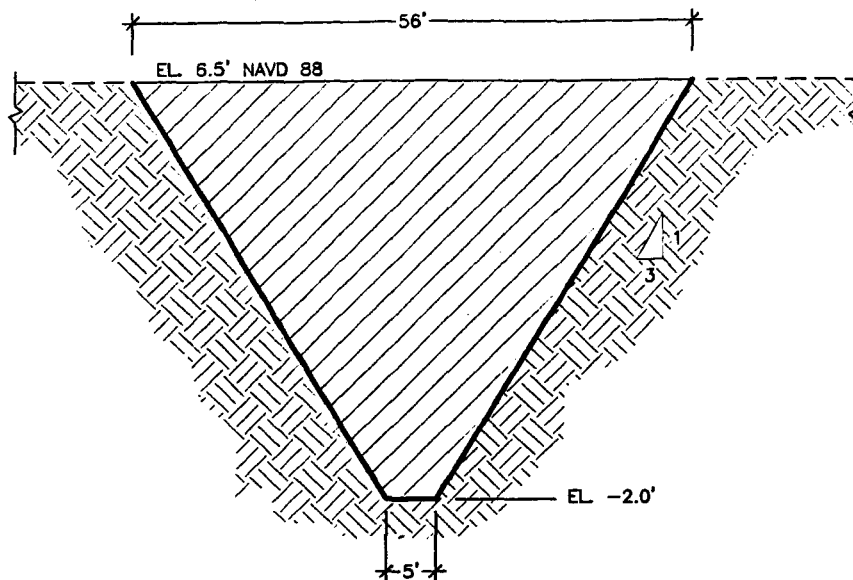
MARIN AUDUBON SOCIETY (MAS)
PO BOX 599
MILL VALLEY, CA 94942

CA DEPT. OF FISH & GAME (DFG)
PO BOX 47
YOUNTVILLE, CA 94558

figure 9

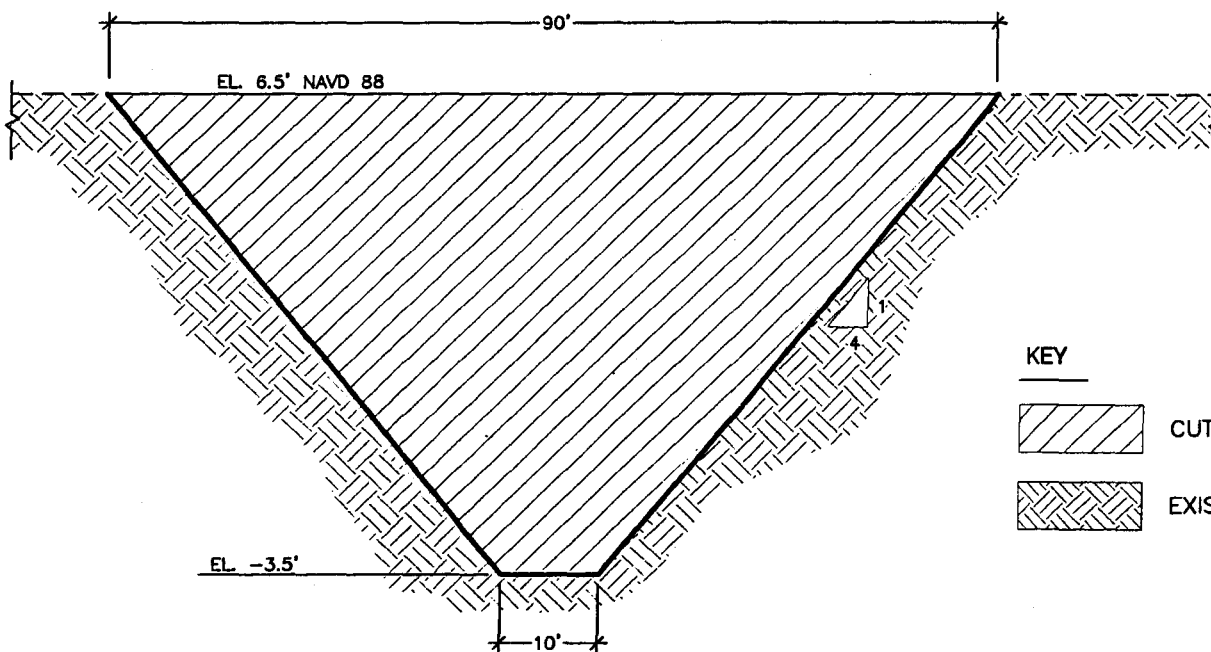
TYPICAL CROSS-SECTION AT VEGETATION BENCH

IN: LOWER PETALUMA RIVER
AT: NOVATO COUNTY OF: MARIN
STATE: CA DATE 06/21/07
APPLICATION BY: MAS & DFG



BREACH CB1, MS2

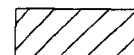
SCALE VERT: 1" = 4'
HORIZ: 1" = 20'



BREACH CB2, MS1

SCALE VERT: 1" = 4'
HORIZ: 1" = 20'

KEY



CUT



EXISTING GROUND

SECTION VIEW

Bahia Wetland Restoration



PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

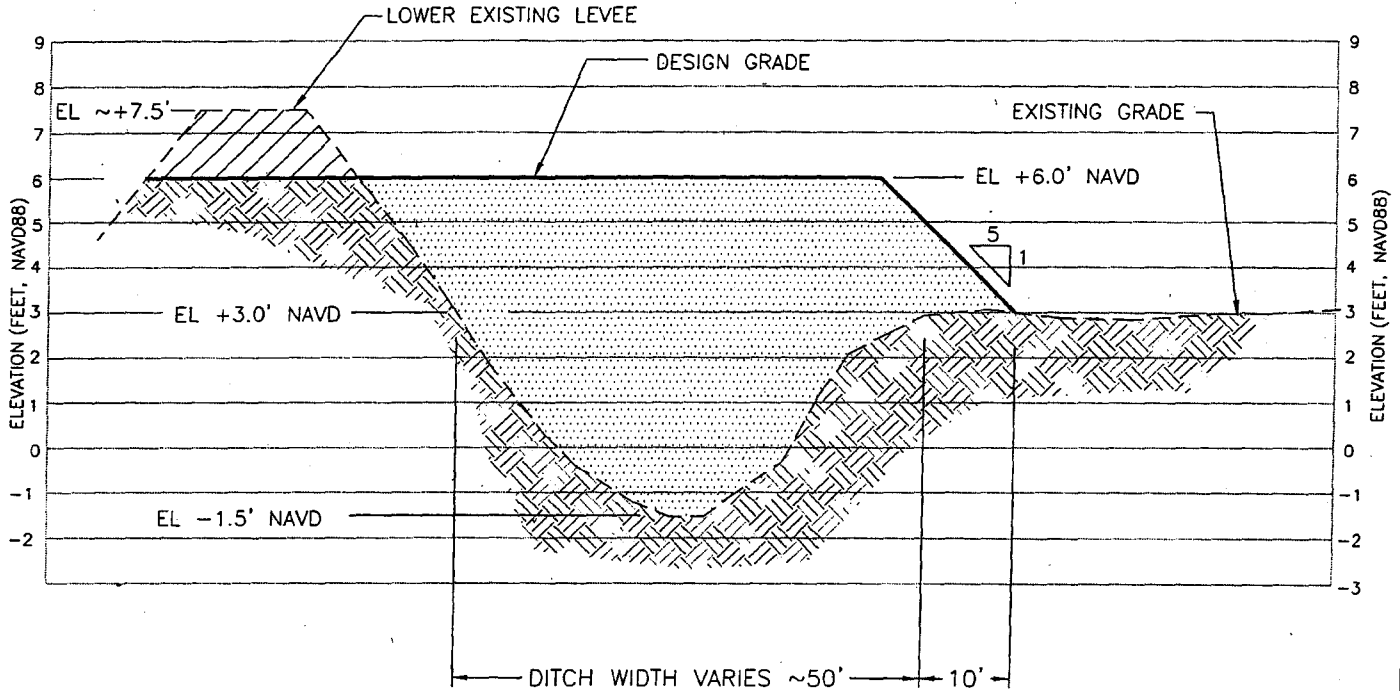
MARIN AUDUBON SOCIETY (MAS)
PO BOX 599
MILL VALLEY, CA 94942

CA DEPT. OF FISH & GAME(DFG)
PO BOX 47
YOUNTVILLE, CA 94558

figure 10

SCHEMATIC OF LEVEE BREACHS-PHASE 1

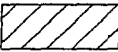

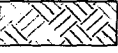
IN: LOWER PETALUMA RIVER
AT: NOVATO COUNTY OF: MARIN
STATE: CA DATE 01/25/07
APPLICATION BY: MAS & DFG



TYPICAL SECTION - DITCH BLOCK (PHASE 2)

SCALE VERT: 1" = 4'
HORIZ: 1" = 20'

KEY

-  CUT
-  FILL
-  EXISTING GROUND

SECTION VIEW



Bahia Wetland Restoration

PURPOSE: HABITAT RESTORATION

DATUM: NAVD88

ADJACENT PROPERTY OWNERS:

1. BAHIA HOMEOWNERS ASSOCIATION
2. CALIFORNIA STATE LANDS COMMISSION
3. MARIN COUNTY OPEN SPACE DISTRICT

MARIN AUDUBON SOCIETY (MAS)
PO BOX 599
MILL VALLEY, CA 94942

CA DEPT. OF FISH & GAME (DFG)
PO BOX 47
YOUNTVILLE, CA 94558

figure 11

SCHEMATIC OF DITCH BLOCK

IN: LOWER PETALUMA RIVER
AT: NOVATO COUNTY OF: MARIN
STATE: CA DATE 05/04/05
APPLICATION BY: MAS & DFG